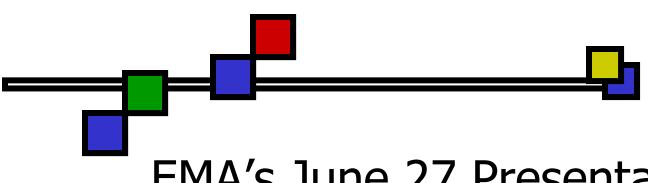


EMA Comments on EPA's June 2002 Highway Diesel Progress Review

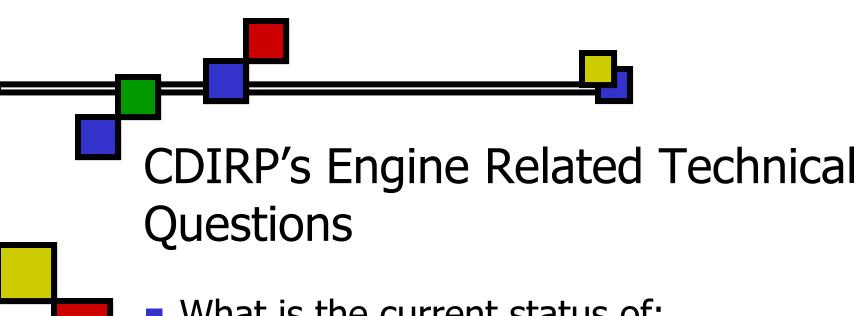




EMA's June 27 Presentation to CDIRP

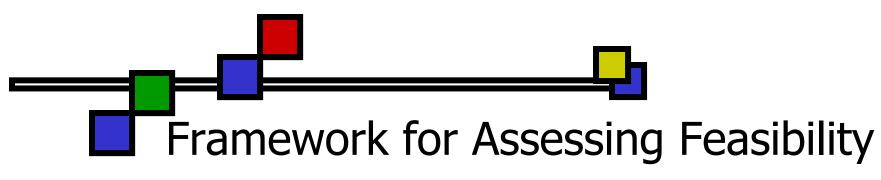
- System's Approach
- Components of Feasibility
- Production Leadtime
- Emphasis on mid-2003 as critical decision time frame
- Need to review EPA Report in detail





- What is the current status of:
 - catalyzed diesel particulate filters?
 - NOx adsorber technology?
- Is progress being made?





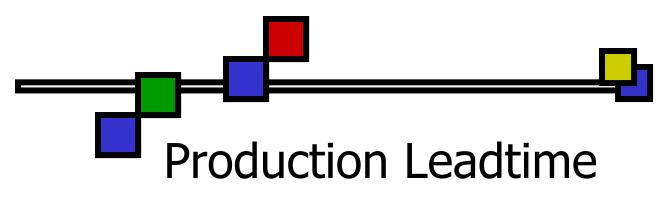
- Functionality
 - **■** Emissions
 - Performance
 - Reliability
- Durability
 - Useful life
- Cost
 - First cost
 - Fuel economy
 - Maintenance
 - Installation impact
 - Infrastructure





- Requirements must be met
 - under all regulated test procedures
 - at expanded ambient conditions
 - for up to 435,000 mile Useful Life
- Extensive system and vehicle integration requirements (by non-vertically integrated industries)
- The time period between now and the effect date of the emission standards is <u>not</u> the time available for technology development

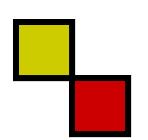




- Practicality of technologies must be established sufficiently in advance of the effect date (generally, 4 years)
- Leadtime (after technologies are established) is required
 - for vehicle integration
 - to conduct durability and field testing
 - to obtain capital
 - to order tooling
 - to approve production parts







- Availability and use of <15 ppm sulfur fuel is</p> essential
- Maintaining adequate temperature for regeneration under all conditions
- Avoidance of mis-fueling

- Assuring reliability and durability of complex particulate reduction system
- Addressing maintenance issues (e.g. ash)
- Minimizing costs



| Definition of Feasibility | Discussed in EPA Report | EMA Current Assessment |
|----------------------------------|-------------------------|------------------------|
| Functionality | | |
| Emissions | No | |
| Performance | No | |
| Reliability | Yes | |
| Durability | | |
| Useful Life | No | |
| Cost | | |
| First Cost | No | |
| Fuel Economy | Yes | |
| Maintenance | Yes | |

No

No

Installation Impact

Infrastructure



Significant Issues remain to be resolved

No Solution - Invention Required

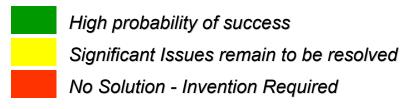


- Development and application to heavyduty is well behind CDPF
- Narrow NOx conversion temperature window
- Conversion efficiency losses during desulfation

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- Management of sulfur poisoning
- Complex and challenging vehicle integration issues
- Durability issues
- Minimizing costs

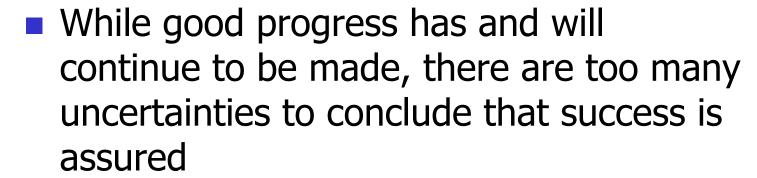




| Definition of Feasibility | Discussed in EPA Report | EMA Current Assessment |
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| Functionality | | |
| Emissions | Yes | |
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| Durability | | |
| Useful Life | Yes | |
| Cost | | |
| First Cost | No | |
| Fuel Economy | Yes | |
| Maintenance | No | |
| Installation Impact | Yes | |
| Infrastructure | No | |

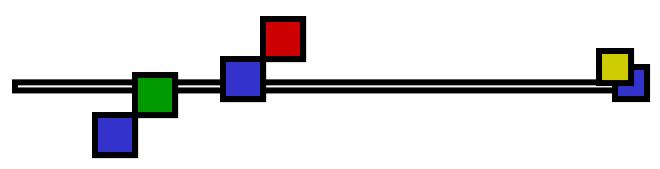




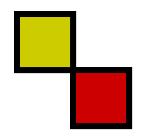


- Many technical challenges and questions remain to assure a cost-effective, customer acceptable product by 2007
- The availability and use of <15 ppm sulfur diesel fuel is a condition precedent





Summary and Conclusion (cont)



- The measure of success is the availability of commercially acceptable products by 2007
- Manufacturers do not have between now and 2007 to develop technology



- manufacturers have approximately one year to make a technology choice selection
- EPA should review the status of progress in mid-2003